

Appl. No. 09/995,004  
Reply to Final OA Dated September 23, 2005

1 **LISTING OF THE CLAIMS**

2 Claims 1-78 are pending. No claims are amended, canceled, or withdrawn.

3  
4 The following listing of claims replaces all prior versions and listings of claims in  
5 the application.

6  
7 1. (Original) In a distributed computing environment, a method for  
8 dynamically implementing workflow responsive to a directory object state change,  
9 the method comprising:

10 detecting a state change to an object in a directory; and  
11 responsive to detecting the state change:

12 mapping the state change to the object to a workflow comprising a  
13 set of tasks; and

14 executing the tasks to achieve a desired state in the directory.

15  
16 2. (Original) A method as recited in claim 1, wherein executing the  
17 tasks further comprises storing the desired state.

18  
19 3. (Original) A method as recited in claim 1, wherein executing the  
20 tasks further comprises continuously executing an operation of a task of the tasks  
21 until convergence of the desired state is identified.

22  
23 4. (Original) A method as recited in claim 1, wherein executing the  
24 tasks further comprises storing a sequence of operations based on the tasks.

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1       5. (Original) A method as recited in claim 1, wherein executing the  
2 tasks further comprises storing information corresponding to one or more directory  
3 objects to which the workflow applies.

4  
5       6. (Original) A method as recited in claim 1, wherein executing the  
6 tasks further comprises storing status information based on respective status of at  
7 least one subset of the tasks.

8  
9       7. (Original) A method as recited in claim 1, wherein mapping the state  
10 change to the object further comprises evaluating the state change to the object  
11 based on a declarative condition stored as a text string on an object instance of a  
12 content class defined by the directory schema.

13  
14       8. (Original) A method as recited in claim 1, wherein a task of the tasks  
15 comprises any combination of a declarative condition or an operation that is stored  
16 as a text string on an object instance of a content class defined by the directory  
17 schema.

18  
19       9. (Original) A method as recited in claim 1, wherein semantics of the  
20 workflow are based on a workflow schema.

21  
22       10. (Original) A method as recited in claim 1, wherein mapping the state  
23 change to the object, semantics of the mapping are based on an event association  
24 object schema.

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1        11. (Original) A method as recited in claim 1, wherein executing the  
2 tasks at least one subset of the tasks are executed with respect to one another based  
3 on an order of execution relationship comprising a finish-start relationship, a  
4 parallel execution relationship, a precedence constraint relationship, or a task  
5 priority relationship.

6  
7        12. (Original) A method as recited in claim 1, wherein executing the  
8 tasks at least one subset of the tasks is executed with respect to one another based  
9 on a precedence constraint relationship or a task priority relationship.

10  
11       13. (Original) A method as recited in claim 1, wherein the method  
12 further comprises:

13       monitoring a status corresponding to a task of the tasks;  
14       storing the status on a status monitoring object; and  
15       wherein a content class in the directory schema defines the status-  
16 monitoring object.

17  
18       14. (Original) A method as recited in claim 1, wherein the method  
19 further comprises:

20       monitoring a set of directory resources affected by the workflow;  
21       storing the directory resources on a status monitoring object; and  
22       wherein a content class in the directory schema defines the status-  
23 monitoring object.

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1        15. (Original) A method as recited in claim 1, wherein the method  
2 further comprises:

3            monitoring a status corresponding to an operation of the workflow;

4            determining that the status comprises a failure status;

5            responsive to the determining, taking a corrective action to advance the  
6 workflow in view of the failure status; and

7            wherein a content class in the directory schema defines the status-  
8 monitoring object.

9  
10        16. (Original) A method as recited in claim 1, wherein executing the  
11 tasks further comprises:

12            updating a status corresponding to a task in the workflow; and

13            responsive to the updating, evaluating the workflow to determine that a  
14 next task of the tasks to be implemented.

15  
16        17. (Original) A method as recited in claim 1, wherein the tasks  
17 represent an inverse set of tasks that were previously performed as part of a  
18 different workflow.

19  
20        18. (Original) A method as recited in claim 1, wherein the tasks  
21 implement a policy with respect to one or more directory resources, and wherein  
22 mapping the state change to the object further comprises automatically  
23 determining the workflow based on the policy.

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1        19. (Original) A computer-readable medium comprising computer-  
2 executable instructions for dynamically implementing workflow responsive to a  
3 directory object state change, the computer-executable instructions comprising  
4 instructions for:

5            detecting a state change to an object in a directory; and

6            responsive to detecting the state change:

7            mapping the state change to the object to a workflow comprising a set of  
8 tasks; and

9            executing the tasks to achieve a desired state in the directory.

10  
11        20. (Original) A computer-readable medium as recited in claim 19,  
12 wherein the instructions for executing the tasks further comprise instructions for  
13 storing the desired state.

14  
15        21. (Original) A computer-readable medium as recited in claim 19,  
16 wherein the instructions for executing the tasks further comprise instructions for  
17 continuously executing an operation of a task of the tasks until convergence of the  
18 desired state is identified.

19  
20        22. (Original) A computer-readable medium as recited in claim 19,  
21 wherein the instructions for executing the tasks further comprise instructions for  
22 storing a sequence of operations based on the tasks.

23  
24        23. (Original) A computer-readable medium as recited in claim 19,  
25 wherein instructions for executing the tasks further comprise instructions for

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1 storing information corresponding to one or more directory objects to which the  
2 workflow applies.

3  
4 24. (Original) A computer-readable medium as recited in claim 19,  
5 wherein the instructions for executing the tasks further comprise instructions for  
6 storing status information based on respective status of at least one subset of the  
7 tasks.

8  
9 25. (Original) A computer-readable medium as recited in claim 19,  
10 wherein the instructions for mapping the state change to the object further  
11 comprise instructions for evaluating the state change to the object based on a  
12 declarative condition stored as a text string on an object instance of a content class  
13 defined by the directory schema.

14  
15 26. (Original) A computer-readable medium as recited in claim 19,  
16 wherein a task of the tasks comprises any combination of declarative conditions  
17 and operations that are stored as a text string on an object instance of a content  
18 class defined by the directory schema.

19  
20 27. (Original) A computer-readable medium as recited in claim 19,  
21 wherein semantics of the workflow are based on a workflow schema.

22  
23 28. (Original) A computer-readable medium as recited in claim 19,  
24 wherein the instructions for mapping the state change to the object, semantics of  
25 the mapping are based on an event association object schema.

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1  
2 29. (Original) A computer-readable medium as recited in claim 19,  
3 wherein the instructions for executing the tasks, at least one subset of the tasks are  
4 executed with respect to one another based on an order of execution relationship  
5 comprising a finish-start relationship, a parallel execution relationship, a  
6 precedence constraint relationship, or a task priority relationship.

7  
8 30. (Original) A computer-readable medium as recited in claim 19,  
9 wherein the instructions for executing the tasks, at least one subset of the tasks are  
10 executed with respect to one another based on a precedence constraint relationship  
11 or a task priority relationship.

12  
13 31. (Original) A computer-readable medium as recited in claim 19,  
14 wherein the computer-executable instructions further comprise instructions for:

15 monitoring a status corresponding to a task of the tasks;  
16 storing the status on a status monitoring object; and  
17 wherein a content class in the directory schema defines the status-  
18 monitoring object.

19  
20 32. (Original) A computer-readable medium as recited in claim 19,  
21 wherein the computer-executable instructions further comprise instructions for:

22 monitoring a set of directory resources affected by the workflow;  
23 storing the directory resources on a status monitoring object; and  
24 wherein a content class in the directory schema defines the status-  
25 monitoring object.

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1           33. (Original) A computer-readable medium as recited in claim 19,  
2           wherein the computer-executable instructions further comprises instructions for:

3                 monitoring a status corresponding to an operation of the workflow;  
4                 determining that the status comprises a failure status;  
5                 responsive to the determining, taking a corrective action to advance the  
6                 workflow in view of the failure status; and

7                 wherein a content class in the directory schema defines the status-  
8                 monitoring object.

9  
10           34. (Original) A computer-readable medium as recited in claim 19,  
11           wherein the instructions for executing the tasks further comprise instructions for:

12                 updating a status corresponding to a task in the workflow; and  
13                 responsive to the updating, evaluating the workflow to determine that a  
14                 next task of the tasks to be implemented.

15  
16           35. (Original) A computer-readable medium as recited in claim 19,  
17           wherein the tasks represent an inverse set of tasks that were previously performed  
18           as part of a different workflow.

19  
20           36. (Original) A computer-readable medium as recited in claim 19,  
21           wherein the tasks implement a policy with respect to one or more directory  
22           resources, and wherein the instructions for mapping the state change to the object  
23           further comprises instructions for automatically determining the workflow based  
24           on the policy.

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1           37. (Original) A computing device comprising:

2            a memory comprising computer-executable instructions for dynamically  
3            implementing workflow responsive to a directory object state change; and

4            a processor coupled to the memory for executing the computer-executable  
5            instructions, the computer-executable instructions comprising instructions for:

6            detecting a state change to an object in a directory; and

7            responsive to detecting the state change:

8            mapping the state change to the object to a workflow comprising a set of  
9            tasks; and

10           executing the tasks to achieve a desired state in the directory.

11           38. (Original) A computing device as recited in claim 37, wherein the  
12           instructions for executing the tasks further comprise instructions for storing the  
13           desired state.

14           39. (Original) A computing device as recited in claim 37, wherein the  
15           instructions for executing the tasks further comprise instructions for continuously  
16           executing an operation of a task of the tasks until convergence of the desired state  
17           is identified.

18           40. (Original) A computing device as recited in claim 37, wherein the  
19           instructions for executing the tasks further comprise instructions for storing a  
20           sequence of operations based on the tasks.

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1       41. (Original) A computing device as recited in claim 37, wherein  
2       instructions for executing the tasks further comprise instructions for storing  
3       information corresponding to one or more directory objects to which the workflow  
4       applies.

5  
6       42. (Original) A computing device as recited in claim 37, wherein the  
7       instructions for executing the tasks further comprise instructions for storing status  
8       information based on respective status of at least one subset of the tasks.

9  
10      43. (Original) A computing device as recited in claim 37, wherein the  
11     instructions for mapping the state change to the object further comprise  
12     instructions for evaluating the state change to the object based on a declarative  
13     condition stored as a text string on an object instance of a content class defined by  
14     the directory schema.

15  
16      44. (Original) A computing device as recited in claim 37, wherein a task  
17     of the tasks comprises any combination of one or more declarative conditions and  
18     one or more operations represented by a text string stored on an object instance of  
19     a content class defined by the directory schema.

20  
21      45. (Original) A computing device as recited in claim 37, wherein  
22     semantics of the workflow are based on a workflow schema.

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1        46. (Original) A computing device as recited in claim 37, wherein the  
2        instructions for mapping the state change to the object, semantics of the mapping  
3        are based on an event association object schema.

4  
5        47. (Original) A computing device as recited in claim 37, wherein the  
6        instructions for executing the tasks, at least one subset of the tasks are executed  
7        with respect to one another based on an order of execution relationship comprising  
8        a finish-start relationship, a parallel execution relationship, a precedence constraint  
9        relationship, or a task priority relationship.

10  
11        48. (Original) A computing device as recited in claim 37, wherein the  
12        instructions for executing the tasks, at least one subset of the tasks are executed  
13        with respect to one another based on a precedence constraint relationship or a task  
14        priority relationship.

15  
16        49. (Original) A computing device as recited in claim 37, wherein the  
17        computer-executable instructions further comprise instructions for:  
18                monitoring a status corresponding to a task of the tasks;  
19                storing the status on a status monitoring object; and  
20                wherein a content class in the directory schema defines the status-  
21        monitoring object.

22  
23        50. (Original) A computing device as recited in claim 37, wherein the  
24        computer-executable instructions further comprise instructions for:  
25                monitoring a set of directory resources affected by the workflow;

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storing the directory resources on a status monitoring object; and  
wherein a content class in the directory schema defines the status-  
monitoring object.

51. (Original) A computing device as recited in claim 37, wherein the computer-executable instructions further comprises instructions for:

monitoring a status corresponding to an operation of the workflow;

determining that the status comprises a failure status;

responsive to the determining, taking a corrective action to advance the workflow in view of the failure status; and

wherein a content class in the directory schema defines the status-monitoring object.

52. (Original) A computing device as recited in claim 37, wherein the instructions for executing the tasks further comprise instructions for:

updating a status corresponding to a task in the workflow; and

responsive to the updating, evaluating the workflow to determine that a next task of the tasks to be implemented.

53. (Original) A computing device as recited in claim 37, wherein the tasks represent an inverse set of tasks that were previously performed as part of a different workflow.

54. (Original) A computing device as recited in claim 37, wherein the tasks implement a policy with respect to one or more directory resources, and

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1 wherein the instructions for mapping the state change to the object further  
2 comprises instructions for automatically determining the workflow based on the  
3 policy.

4

5 55. (Original) A computing device comprising processing means for:  
6 detecting a state change to an object in a directory; and  
7 responsive to detecting the state change:  
8 mapping the state change to the object to a workflow comprising a set of  
9 tasks; and  
10 executing the tasks to achieve a desired state in the directory.

11

12 56. (Original) A computing device as recited in claim 55, wherein the  
13 means for executing the tasks further comprise means for storing the desired state.

14

15 57. (Original) A computing device as recited in claim 55, wherein the  
16 means for executing the tasks further comprise means for continuously executing  
17 an operation of a task of the tasks until convergence of the desired state is  
18 identified.

19

20 58. (Original) A computing device as recited in claim 55, wherein the  
21 means for executing the tasks further comprise means for storing a sequence of  
22 operations based on the tasks.

23

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1        59. (Original) A computing device as recited in claim 55, wherein  
2        means for executing the tasks further comprise means for storing information  
3        corresponding to one or more directory objects to which the workflow applies.

4

5        60. (Original) A computing device as recited in claim 55, wherein the  
6        means for executing the tasks further comprise means for storing status  
7        information based on respective status of at least one subset of the tasks.

8

9        61. (Original) A computing device as recited in claim 55, wherein the  
10       means for mapping the state change to the object further comprise means for  
11       evaluating the state change to the object based on a declarative condition stored as  
12       a text string on an object instance of a content class defined by the directory  
13       schema.

14

15       62. (Original) A computing device as recited in claim 55, wherein a task  
16       of the tasks comprises any combination of one or more declarative conditions and  
17       one or more operations represented by a text string stored on an object instance of  
18       a content class defined by the directory schema.

19

20       63. (Original) A computing device as recited in claim 55, wherein  
21       semantics of the workflow are based on a workflow schema.

22

23       64. (Original) A computing device as recited in claim 55, wherein the  
24       means for mapping the state change to the object, semantics of the mapping are  
25       based on an event association object schema.

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1  
2 65. (Original) A computing device as recited in claim 55, wherein the  
3 means for executing the tasks, at least one subset of the tasks are executed with  
4 respect to one another based on an order of execution relationship comprising a  
5 finish-start relationship, a parallel execution relationship, a precedence constraint  
6 relationship, or a task priority relationship.

7  
8 66. (Original) A computing device as recited in claim 55, wherein the  
9 means for executing the tasks, at least one subset of the tasks are executed with  
10 respect to one another based on a precedence constraint relationship or a task  
11 priority relationship.

12  
13 67. (Original) A computing device as recited in claim 55, further  
14 comprising processing means for:

15 monitoring a status corresponding to a task of the tasks;  
16 storing the status on a status monitoring object; and  
17 wherein a content class in the directory schema defines the status-  
18 monitoring object.

19  
20 68. (Original) A computing device as recited in claim 55, further  
21 comprising processing means for:

22 monitoring a set of directory resources affected by the workflow;  
23 storing the directory resources on a status monitoring object; and  
24 wherein a content class in the directory schema defines the status-  
25 monitoring object.

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1  
2 69. (Original) A computing device as recited in claim 55, further  
3 comprising processing means for:

4 monitoring a status corresponding to an operation of the workflow;  
5 determining that the status comprises a failure status;  
6 responsive to the determining, taking a corrective action to advance the  
7 workflow in view of the failure status; and  
8 wherein a content class in the directory schema defines the status-  
9 monitoring object.

10  
11 70. (Original) A computing device as recited in claim 55, wherein the  
12 means for executing the tasks further comprise means for:

13 updating a status corresponding to a task in the workflow; and  
14 responsive to the updating, evaluating the workflow to determine that a  
15 next task of the tasks to be implemented.

16  
17 71. (Original) A computing device as recited in claim 55, wherein the  
18 tasks represent an inverse set of tasks that were previously performed as part of a  
19 different workflow.

20  
21 72. (Original) A computing device as recited in claim 55, wherein the  
22 tasks implement a policy with respect to one or more directory resources, and  
23 wherein the means for mapping the state change to the object further comprise  
24 means for automatically determining the workflow based on the policy.

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1        73. (Previously presented) A workflow enabled directory schema  
2 comprising a plurality of base object content classes, the workflow enabled  
3 directory schema:

4            a provisioning service content class to detect an event corresponding to a  
5 state change in a directory object;

6            a workflow content class for storing a sequence of tasks;

7            an event association content class for storing declarative conditions to map  
8 the state change to the directory object to an object instance of the workflow  
9 content class; and

10           wherein the provisioning service content class is further configured to  
11 execute the sequence of tasks corresponding to the object instance.

12  
13        74. (Original) A workflow enabled directory schema as recited in claim  
14 73, wherein at least a subset of the base object content classes comprise a  
15 respective flexible attribute data field that indicates a data type, the data type being  
16 used to express various operational or data providing properties of the flexible  
17 attribute, the various operational or data providing properties being independent of  
18 the data type and independent of any modification to the workflow enabled  
19 directory schema.

20  
21        75. (Original) A workflow enabled directory schema as recited in claim  
22 73, wherein the sequence of tasks comprises any combination of a declarative  
23 conditions and operations corresponding to directory-based objects.

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1        76. (Original) A workflow enabled directory schema as recited by claim  
2        73, further comprising a status monitoring content class for storing a status of an  
3        object instance of the workflow content class.

4  
5        77. (Original) A computer-readable medium comprising a workflow  
6        enabled directory schema as recited in claim 73.

7  
8        78. (Original) A computer comprising a computer-readable medium  
9        comprising a workflow enabled directory schema as recited in claim 73.

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